PAT-NO: JP407041561A
DOCUMENT-IDENTIFIER: JP 07041561 A
TITLE: METHOD FOR PULVERIZING FUNCTIONAL HIGH-MOLECULAR RESIN MATERIAL

PUBN-DATE: February 10, 1995

INVENTOR-INFORMATION:

NAME	COUNTRY
OOUCHI, MUNESHIRO	

ASSIGNEE-INFORMATION:

NAME	COUNTRY
KK MIURA KENKYUSHO	N/A

APPL-NO: JP05202966
APPL-DATE: July 23, 1993

INT-CL (IPC): C08J003/12

ABSTRACT: Derwent

PURPOSE: To obtain fine particles of a resin material in a short time without causing softening of the material and without causing much noise by pulverizing lumps or granules of the material under impact in the presence of an inert liq.

CONSTITUTION: Fine particles of a functional high-molecular resin material with an average particle size of 2-3μm are obtd. by supplying lumps or granules of the material together with water (as an inert fluid) to a pulverizer where the lumps or granules in a form of a mixture with water are pulverized under impact while cooling the machine itself and the material with water and thereby preventing softening of the material. Resin materials suitable

to be thus pulverized include a styrenic or acrylic thermoplastic ion-exchange resin which softens at 80°C or higher to absorb impact, an easily oxidizable anion-exchange resin with a low chemical resistance, a thermosetting functional high-molecular resin, and some natural resin.

COPYRIGHT: (C)1995,JPO

PAJ translation

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention is the purpose of expanding surface area for improved efficiency, or the purpose of creating a hybrid functionality resin material, and relates to the method of obtaining a detailed functional polymer resin particle with a particle diameter of several micrometers or less.
[0002]
[Description of the Prior Art]conventionally, it being the purpose of expanding surface area for improved efficiency, or, or [compounding from the beginning to the target particle diameter, when making a detailed resin particle profitably like in order to create hybrid functionality resin, and compounding polymer resin] -- or, After compounding the functional polymer of the condition of comparatively big particle diameter or a lump, the functional polymer particles of the target particle diameter have been obtained by crushing this.
[0003]In the method of the above-mentioned former, if the target particle diameter becomes tens of micrometer order, a machine and setting out of a synthetic condition will become severe, and the cost of the resin particle created as a result will become very expensive.
[0004]On the other hand, although the operation which crushes a resin material increases in the latter method, there is an advantage that a manufacturing cost is cheap compared with the former method. As a method of crushing such a resin material, Conventionally, there are "method of putting a resin material on a high-speed flow, making a resin material comrade collide, and grinding", "method of paying and grinding a resin material to a grinder like a turbo fan", "method of paying and grinding a resin material to the grinder of the form rubbed and crushed so that it may be a mill etc.", etc. According to the above crushing methods, the thing up to tens of micrometers is obtained with mean particle diameter.
[0005]
[Problem(s) to be Solved by the Invention]However, since the resin material is excellent in elasticity when based on the above crushing methods, If a resin lump becomes soft with the heat which is hard to crush depending on a mechanical shock, and is generated at the time of grinding, in order to absorb a mechanical shock further, crushing becomes difficult more, and it is finer than ****, for example, it very difficult to obtain a thing with a particle diameter of about several micrometers.
[0006]Depending on the kind of resin, a re-granulation and the conversion of resin itself, i.e., the chemical nature of a functional polymer, will change with the heat at the time of the above-mentioned crushing.
[0007]therefore, a resin material is cooled and frozen with liquid nitrogen etc., and where pliability is reduced very much to a degree, it grinds mechanically -- **** (frost-shattering method) -- tens of micrometers are a limit in mean particle diameter, and it needs to be furnished for freezing -- etc. -- a steep cost rise poses a problem from a reason.
[0008]Medicine other than what is depended on the above mechanical techniques, etc. are used as a method of subdividing a resin material, and there is the method of cutting and re-corning intermolecular association chemically once, i.e., the method of re-corning, once dissolving. However, this method cannot be used when a resin material does not dissolve in medicine. It cannot apply to what has the low chemical resistance of the resin material itself, and the function of engineering plastics may be spoiled by this medicine, and there is no flexibility. In view

of said problem, this invention is low cost and an object of an invention is to provide the crushing method for obtaining the resin material which the request microatomized.
[0009]
[Means for Solving the Problem]It is a crushing method of a functional polymer resin material, wherein this invention was made in order to cancel an aforementioned problem, gives a shock with a grinder, crushes a lump of a functional polymer resin material, or particles with an inert liquid object and obtains resin grains of a diameter of a particle.
[0010]
[Function]In this invention, a shock is given for the lump of a functional polymer resin material, or particles with a grinder with an inert liquid object.
Therefore, where softening of the resin material by generation of heat is controlled, this resin material is crushed even to the detailed particle diameter of hope for a short time.

[0011]
[Example]Hereafter, the case where this invention is applied to ion-exchange resin of a styrene system and an acrylic acid series as functional polymer resin is explained.
[0012]Although this kind of ion-exchange resin does not melt into medicine and some are stable to chemicals in some ion-exchange resin of ****, if it generally becomes the temperature beyond abbreviated 80 **, that pliability will increase remarkably, a mechanical shock is absorbed, and grinding becomes difficult by the conventional method. On the other hand, in anion exchange resin, by heat and oxygen, oxidation or since it changes chemically (chemical resistance is low) and the function is lost, crushing by the conventional method cannot be performed.
[0013]Then, the lump of the above-mentioned resin material and particles are supplied to a crusher (grinder) with the water as an inert liquid object, and crushing operation is performed as a mixture. Then, although generation of heat of the crusher at the time of crushing operation itself and generation of heat of resin itself crushed arise, this heat is cooled with the water supplied with the resin material. Therefore, a resin material can be prevented from becoming soft by a rise in heat, by giving a shock by a grinder, crushing operation can be performed very efficiently and resin of desired particle diameter and a powder diameter can be obtained.
[0014]By this invention method and the frost-shattering method which is one of the conventional methods, when the above-mentioned ion-exchange resin was crushed, according to this invention method, ion-exchange resin of the styrene system and the acrylic acid series was actually able to obtain the particle with a mean particle diameter of 2-3 micrometers, but. In the conventional method, only the thing with a mean particle diameter of about 20 micrometers was obtained. Even if it sees from this result, according to this invention method, compared with the conventional method, it turns out that the particles of a byway are obtained remarkably.
[0015]According to this method, although the microatomized resin powder arises at the time of crushing of this resin material, since it is as it crushes together with water, the above-mentioned resin powder can disperse, and it can prevent polluting work environment, and such resin powder can be collected easily.
[0016]In the above-mentioned example, although the example applied to ion-exchange resin as an example of the resin material which has thermoplasticity was explained, whether it is functional polymer resin which has not only resin such but thermosetting or this invention is a natural resin, it is applicable similarly.
[0017]
[Effect of the Invention]In this invention, a shock is given for the lump and particles which consist of a functional polymer resin material with a grinder with an inert liquid object.
Therefore, in order to be able to crush this resin material easily even to the detailed particle diameter of hope in a short time where softening of the resin material by generation of heat is controlled, and to crush in liquid moreover, there is also little generating of noise.

TECHNICAL FIELD

[Industrial Application]This invention is the purpose of expanding surface area for improved efficiency, or the purpose of creating a hybrid functionality resin material, and relates to the method of obtaining a detailed functional polymer resin particle with a particle diameter of several micrometers or less.

PRIOR ART

[Description of the Prior Art]conventionally, it being the purpose of expanding surface area for improved efficiency, or, or [compounding from the beginning to the target particle diameter, when making a detailed resin particle profitably like in order to create hybrid functionality resin, and compounding polymer resin] -- or, After compounding the functional polymer of the condition of comparatively big particle diameter or a lump, the functional polymer particles of the target particle diameter have been obtained by crushing this.
[0003]In the method of the above-mentioned former, if the target particle diameter becomes tens of micrometer order, a machine and setting out of a synthetic condition will become severe, and the cost of the resin particle created as a result will become very expensive.
[0004]On the other hand, although the operation which crushes a resin material increases in the latter method, there is an advantage that a manufacturing cost is cheap compared with the former method. As a method of crushing such a resin material, Conventionally, there are "method of putting a resin material on a high-speed flow, making a resin material comrade collide, and grinding", "method of paying and grinding a resin material to a grinder like a turbo fan", "method of paying and grinding a resin material to the grinder of the form rubbed and crushed so that it may be a mill etc.", etc. According to the above crushing methods, the thing up to tens of micrometers is obtained with mean particle diameter.

EFFECT OF THE INVENTION

[Effect of the Invention]In this invention, a shock is given for the lump and particles which consist of a functional polymer resin material with a grinder with an inert liquid object.
Therefore, in order to be able to crush this resin material easily even to the detailed particle diameter of hope in a short time where softening of the resin material by generation of heat is controlled, and to crush in liquid moreover, there is also little generating of noise.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, since the resin material is excellent in elasticity when based on the above crushing methods, If a resin lump becomes soft with the heat which is hard to crush depending on a mechanical shock, and is generated at the time of grinding, in order to absorb a mechanical shock further, crushing becomes difficult more, and it is finer than ****, for example, it very difficult to obtain a thing with a particle diameter of about several micrometers.
[0006]Depending on the kind of resin, a re-granulation and the conversion of resin itself, i.e., the chemical nature of a functional polymer, will change with the heat at the time of the above-mentioned crushing.
[0007]therefore, a resin material is cooled and frozen with liquid nitrogen etc., and where pliability is reduced very much to a degree, it grinds mechanically -- **** (frost-shattering method) -- tens of micrometers are a limit in mean particle diameter, and it needs to be furnished for freezing -- etc. -- a

steep cost rise poses a problem from a reason.
[0008]Medicine other than what is depended on the above mechanical techniques, etc. are used as a method of subdividing a resin material, and there is the method of cutting and re-corning intermolecular association chemically once, i.e., the method of re-corning, once dissolving. However, this method cannot be used when a resin material does not dissolve in medicine. It cannot apply to what has the low chemical resistance of the resin material itself, and the function of engineering plastics may be spoiled by this medicine, and there is no flexibility. In view of said problem, this invention is low cost and an object of an invention is to provide the crushing method for obtaining the resin material which the request microatomized.

MEANS

[Means for Solving the Problem]It is a crushing method of a functional polymer resin material, wherein this invention was made in order to cancel an aforementioned problem, gives a shock with a grinder, crushes a lump of a functional polymer resin material, or particles with an inert liquid object and obtains resin grains of a diameter of a particle.

OPERATION

[Function]In this invention, a shock is given for the lump of a functional polymer resin material, or particles with a grinder with an inert liquid object.
Therefore, where softening of the resin material by generation of heat is controlled, this resin material is crushed even to the detailed particle diameter of hope for a short time.

EXAMPLE

[Example]Hereafter, the case where this invention is applied to ion-exchange resin of a styrene system and an acrylic acid series as functional polymer resin is explained.
[0012]Although this kind of ion-exchange resin does not melt into medicine and some are stable to chemicals in some ion-exchange resin of ****, if it generally becomes the temperature beyond abbreviated 80 **, that pliability will increase remarkably, a mechanical shock is absorbed, and grinding becomes difficult by the conventional method. On the other hand, in anion exchange resin, by heat and oxygen, oxidation or since it changes chemically (chemical resistance is low) and the function is lost, crushing by the conventional method cannot be performed.
[0013]Then, the lump of the above-mentioned resin material and particles are supplied to a crusher (grinder) with the water as an inert liquid object, and crushing operation is performed as a mixture. Then, although generation of heat of the crusher at the time of crushing operation itself and generation of heat of resin itself crushed arise, this heat is cooled with the water supplied with the resin material. Therefore, a resin material can be prevented from becoming soft by a rise in heat, by giving a shock by a grinder, crushing operation can be performed very efficiently and resin of desired particle diameter and a powder diameter can be obtained.
[0014]By this invention method and the frost-shattering method which is one of the conventional methods, when the above-mentioned ion-exchange resin was crushed, according to this invention method, ion-

exchange resin of the styrene system and the acrylic acid series was actually able to obtain the particle with a mean particle diameter of 2-3 micrometers, but. In the conventional method, only the thing with a mean particle diameter of about 20 micrometers was obtained. Even if it sees from this result, according to this invention method, compared with the conventional method, it turns out that the particles of a byway are obtained remarkably.

[0015]According to this method, although the microatomized resin powder arises at the time of crushing of this resin material, since it is as it crushes together with water, the above-mentioned resin powder can disperse, and it can prevent polluting work environment, and such resin powder can be collected easily.

[0016]In the above-mentioned example, although the example applied to ion-exchange resin as an example of the resin material which has thermoplasticity was explained, whether it is functional polymer resin which has not only resin such but thermosetting or this invention is a natural resin, it is applicable similarly.

CLAIMS

[Claim(s)]

[Claim 1]A lump of functional polymer resin, or a crushing method of a functional polymer resin material giving a shock with a grinder, crushing particles with an inert liquid object, and obtaining resin grains of a diameter of a particle.